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ON THE EXISTING GENERA OF THE TRIONYCHIDÆ.

BY O. P. HAY.

(Read October 2, 1903.)

This subject was discussed in an interesting and instructive manner by Dr. George Baur in the PROCEEDINGS OF THE AMERICAN PHILOSOPHICAL SOCIETY, Vol. xxxi, p. 221, 1893. However, the present writer, on investigating the subject, has not been able to agree with Dr. Baur in all his conclusions, disagreeing with him partly regarding the types of some of the genera which he adopts, but especially on the value of some of these genera.

Dr. Baur was undoubtedly correct when he pointed out that the current employment of the name *Trionyx* for the majority of the living Trionychidæ is not justified, and that the genus has for its type *Testudo granosa* Schoepff, called *Trionyx punctata* by Baur, but recorded by Boulenger in his *Catalogue of the Chelonians*, p. 269, as *Emyda granosa*. This is in agreement with the views of Agassiz (*Cont. Nat. Hist. U. S.*, Vol. i, p. 395), who severely condemns the use of the name *Emyda* in this connection. Geoffroy's genus *Trionyx* was divided by Wagler in 1830. *Trionyx* was retained for *Testudo granosa*, while for most of the other species then known the new name *Aspidonectes* was adopted. The names of the species included under it are found in the second column of the table on opposite page. No type was indicated for the genus.

In 1831, Dr. J. E. Gray, in Appendix to Vol. ix of Griffith's *Cuvier's Animal Kingdom*, pp. 18, 19, and again in his *Synopsis Reptilium*, p. 49, applied the name *Emyda* (preoccupied) in place of Wagler's *Trionyx*, and *Trionyx* in place of Wagler's *Aspidonectes*. It is not necessary to add anything here to what Agassiz and Baur have said regarding this procedure, nor to do more than refer to Duméril and Bibron's proposal of the terms *Gymnopus* and *Cryptopus* to replace *Aspidonectes* and *Trionyx* respectively.

In 1836, Fitzinger (*Entwurf Syst. Anordnung Schildkr.*, pp. 119, 120, 127) further subdivided the species of soft-shelled tortoises. He made use of five sections, and these have since been employed as genera. These are *Trionyx*, *Aspidonectes*, *Platypeltis*, *Pelodiscus* and *Amyda*. The species enumerated under each of these are shown in the table already referred to. No types were indicated, but *granosa* was the only one named under *Trionyx*.

Table showing the date of the founding of the genera discussed in this paper, and the type of each.

A species marked with * became a type at that date.

<i>Trionyx.</i>	<i>Aspidonectes.</i>	<i>Platypeltis.</i>	<i>Pelodiscus.</i>	<i>Amyda.</i>	<i>Potamochelys.</i>
Geoffroy, 1809. subplanus. triunguis (ægyptiacus). cartilagineus (stellatus, javanicus). ferox (carinatus, georgicus). granosus (coromandelicus). euphraticus.	Wagler, 1830. triunguis (ægyptiacus). cartilagineus (javanicus). ferox (ferox, carinatus). spiniferus. muticus.	Fitzinger, 1836. *ferox (ferox, brongnartii). Bonaparte, 1836. ferox.	Fitzinger, 1836. sinensis. triunguis (labiatus). Bonaparte, 1836. *sinensis.	Fitzinger, 1836. subplana. mutica. euphratica. Bonaparte, 1836. *subplana.	Fitzinger, 1843. *cartilagineus (javanicus).
Wagler, 1830. *granosus (coromandelicus).	Fitzinger, 1836. triunguis (ægyptiacus). cartilagineus (javanicus). hurum. indicus.	Fitzinger, 1843. ferox.	Fitzinger, 1843. sinensis.	Fitzinger, 1843. subplana.	
Fitzinger, 1836. granosus.	Bonaparte, 1836. *triunguis (ægyptiacus).	<i>Tyrse.</i>	<i>Dogania.</i>	<i>Chitra.</i>	<i>Isola.</i>
Bonaparte, 1836. granosus.	Fitzinger, 1843. triunguis (ægyptiacus).	Gray, 1844. hurum (gangetica). gangetica (javanica). sinensis (percellata). triunguis (nilotica). spinifera (argus). euphratica (rafflesii).	Gray, 1844. *subplana.	Gray, 1844. *indica.	Gray, 1873. *formosa (peguenensis).

Dr. Baur, in the paper referred to, concludes that inasmuch as the species *cartilagineus (javanicus)*¹ was fully figured by Fitzinger, it is the one to be regarded as the type of *Aspidonectes*. In coming to this conclusion he does not give due weight to what Fitzinger himself, in 1843, has done in the case; much less has he noted what Bonaparte had done still earlier. In Wiegmann's *Archiv für Naturgeschichte*, iv, 1, 1838, pp. 136–142, we find a paper by C. L. Bonaparte, entitled “Cheloniorum Tabula Analytica.” In 1836 the same author issued at Rome a pamphlet of ten pages which bore the same title. This is understood to be a reprint from the *Giornale Arcadico*. I have not been able to see either the paper in the *Giornale* or the reprint, but Dr. Theodore Gill kindly informs me that the reprint made at Rome differs in only unimportant respects from the paper in the *Archiv für Naturgeschichte*. We find therefore, in this paper of 1836, that Bonaparte accepts two genera of Trionychidæ, *Amyda* and *Trionyx*, with four divisions under the former. With each of his names he mentions a single species, and these species, it seems to the present writer, must be regarded as the types of these subdivisions, all later treated as genera. Under *Trionyx* he mentions *Testudo granosa*; under *Aspidonectes*, *Trionyx triunguis (ægyptiacus)*; under *Platypeltis*, *Testudo ferox*; under *Pelodiscus*, *Aspidonectes sinensis*, and under *Amyda*, *Trionyx subplanus*.

In 1843, Fitzinger (*Systema Reptilium*, p. 30) presented essentially the same arrangement of the Trionychidæ that Bonaparte had published in 1836. His two genera are *Trionyx* and *Aspidonectes*, the latter having under it five subdivisions, or subgenera. For *Trionyx*, *Aspidonectes*, *Platypeltis*, *Pelodiscus* and *Amyda*, he employed the same species as examples, or types, as did Bonaparte. For the newly proposed subdivision *Potamochelys* he used as type *P. cartilagineus (javanicus)*. Dr. Baur made the objection that Fitzinger did not define the genus *Potamochelys*; but since the latter author refers to it a well-known species, it must be accepted as a valid genus, in case it really possesses generic characters. That is, technically it meets all the requirements of a generic name.

It may be noted here that Fitzinger's error of 1836, in distributing the species *triunguis*, under the names *ægyptiacus* and *labiatus*, to

¹ In the present paper the specific name now recognized is employed; if the author who is quoted employed a different name, this follows in parentheses.

both *Aspidonectes* and *Pelodiscus*, was not repeated in his work of 1843.

We may then, it appears to the writer, regard it as established that the type of the genus *Trionyx* is the species *granosus*; of *Aspidonectes*, the species *triunguis*; of *Platypeltis*, the species *ferox*; of *Pelodiscus*, the species *sinensis*, and of *Amyda*, the species *subplana*.

We must now consider how these determinations are to affect the work of subsequent writers, especially that of Gray, Agassiz, and Baur.

In 1844, Gray (*Cat. Tort., Croc. and Amphib.*, p. 46) established the new genera *Tyrse*, *Dogania* and *Chitra*, besides propagating his erroneous uses of the terms *Trionyx* and *Emyda*. The type of *Chitra* is *Trionyx indica* Gray, and this genus is yet recognized as a valid one. The type of *Dogania* is naturally the only species mentioned under it, *subplanus*; but this had already in 1836 been made by Bonaparte the type of *Amyda*, from which fact it follows that *Dogania* is a synonym of *Amyda*. Under *Tyrse* there were named six species, but no type was selected. In his later publications Gray dropped from *Tyrse* all the species originally included under it, except *triunguis* (*nilotica*). We must then suppose that he regarded this species as the type of the genus; but this was, as we have seen, the type of *Aspidonectes*, made so by Bonaparte in 1836. *Tyrse*, therefore, becomes a synonym of *Aspidonectes*.

Agassiz accepts *Trionyx ferox* as the type of *Platypeltis*. While rejecting *Pelodiscus* as a valid genus, he correctly states that it rests on *Trionyx sinensis* Wiegman. He does not say what he regards as the type of *Aspidonectes*, but he includes under it *Trionyx spiniferus*. *Amyda*, he states, has for its type LeSueur's *Trionyx muticus*; and he tells us that this generic name was vaguely applied by Fitzinger to one of his genera. As we have seen, no type was indicated for *Amyda* in 1836, but in 1843 Fitzinger names under the genus only the species *subplana*. There certainly was no vagueness in this procedure. Furthermore, Bonaparte had already in 1836 indicated the same species as the type of *Amyda*.

As already stated, Dr. Baur regarded the species *cartilagineus* as the type of *Aspidonectes* and *Trionyx muticus* as the type of *Amyda*; whereas Bonaparte in 1836 and Fitzinger in 1843 made *triunguis* (*ægyptiacus*) the type of the former, and *subplanus* as the type of the latter. Baur recognized *Testudo ferox* Schweigg. as the type of

Platypeltis, *Trionyx sinensis* as the type of *Pelodiscus*, and *T. subplanus* as the type of Gray's *Dogania*. Dr. Baur also recognized as valid genera *Cycloderma* Peters, with its type *C. frenatum*; *Cyclanorbis* Gray, with the type *Cryptopus senegalensis*; *Isola* Gray, with the type *Trionyx leithii*; *Chitra* Gray, with the type *Trionyx indicus*, and *Pelochelys*, with the type *P. cantorii*.

Leaving out of consideration the genera *Pelochelys*, *Chitra*, *Cycloderma* and *Cyclanorbis*, as being valid, and likewise invulnerable on other grounds, as well as the various genera founded since 1846, and cited by Boulenger as synonyms of his *Trionyx*, let us consider the content and value of the others.

In his classification of the Trionychidæ, Dr. Baur gave great weight to the amount of reduction of the posterior nares by the inner and posterior extension of the maxilla. To the present writer this character seems to be of little value. The two conditions of being "reduced" and of being "not reduced" can hardly be defined, and they are probably connected by every gradation. It is solely on this character, so far as we know, that he has separated generically his *Pelodiscus agassizii* and *Platypeltis erox* (*Amer. Naturalist*, xxii, p. 1121; *PROC. AMER. PHILOS. SOC.*, xxxi, p. 217).

Trionyx, with *Testudo granosa* as type, must be regarded as a valid genus.

Aspidonectes Wagler, restricted by Bonaparte, 1836, and Fitzinger, 1843, with *Testudo triunguis* Forsk. as type, must be applied to the group designated by Boulenger I, B, 3 (*Cat. Chelonians*, p. 245), and to that included by Baur (*PROC. AMER. PHILOS. SOC.*, xxxi, p. 220) under the name *Pelodiscus*, with the exception of his *P. agassizii*. In the same genus the present writer would include Boulenger's group I, B, 2, containing the species *cartilagineus*, *formosus* and *phayrei*. These were placed by Baur in the genus *Aspidonectes*, as this was limited by him; but did the group form a genus distinct from that whose type is *Testudo triunguis*, it ought to be called *Potamochelys*; since, as already stated, Fitzinger in 1843 made the species *cartilagineus (javanicus)* the type of this genus. This group differs from the preceding only in having "the alveolar surface of the lower jaw with a strong longitudinal symphysial ridge," a character which appears to the writer as insufficient. In the same genus must be placed *Trionyx subplanus* Geoffr. As

already said, Baur recognized it as the type of *Dogania*; but if it is a member of a genus distinct from *Aspidonectes*, it must be called *Amyda*, according to the systems of both Bonaparte and Fitzinger.

Platypeltis comes next, having as its type *Testudo ferox* Schneider. It will include all the American soft-shelled tortoises, except *Aspidonectes californiensis* (Rivers). The writer believes that this group is sufficiently characterized by the possession of only seven pairs of costal plates. The smooth or granular condition of the skin of the young is possibly a character of generic value. In this group must be included LeSueur's *Trionyx muticus*. There appear to be no characters which justify its separation as a distinct genus. Baur makes it the type of *Amyda*, following Agassiz. The only character given by Baur to distinguish it from *Platypeltis spiniferus*, for instance, is the separation of all the costals at the midline by means of neurals; whereas in the other American Trionychidæ the hindermost pair are in contact. This difference depends wholly on the greater or less development of the seventh neural plate; and this will almost certainly be found to vary in different species and in different individuals of the same species. Some importance has been attributed to the absence in *muticus* of the commonly occurring ridges, or papillæ, on the septum of the nares; but this character appears to the present writer to be of slight value. On similar characters the Trionychidæ might probably be divided into as many genera as there are species. If, however, *Trionyx muticus* is to form a distinct genus, a new generic name must be coined for it.

For Boulenger's group I, B, 1, Dr. Baur accepted Gray's generic name *Isola*, having, according to Baur's statement, *Trionyx leithii* as its type. This is, however, an obvious error. The genus was proposed by Gray in 1873 (*Proc. Zool. Soc. Lond.*, p. 51) for the reception of *Trionyx peguensis* Gray, and this is, according to Boulenger, a synonym of *Trionyx formosus*. *T. leithii* was afterward (*Ann. Mag. Nat. Hist.* [4], x, p. 157, 1873) referred to the same genus with some doubt. *Isola* is therefore a synonym of *Aspidonectes*, as recognized in the present paper.

The group of tortoises referred by Baur to *Isola* includes the species *gangeticus*, *hurum* and *leithii*. These species differ from those of *Aspidonectes*, especially in possessing two neural plates between the first costals. It appears to be worthy of generic rank. A search among the generic names which have been applied to the

members of the genus shows that none of them is available. I therefore propose the name *ASPIDERETES* (*ασπίς*, a shield, and *ερέτης*, a rower). The type is *Trionyx gangeticus* Cuvier, and the other living species will be *A. hurum* and *A. leithii*. It seems probable that a number of fossil forms must find their place in the genus.

Stated Meeting, October 16, 1903.

President SMITH in the Chair.

The following papers were presented:

"Evolution and Epigenesis—New Light on an Old Problem," by Prof. E. G. Conklin, which was discussed by Gen. Wistar.

"A Review of Parthenogenesis," by Mr. Everett F. Phillips, communicated by Prof. E. G. Conklin, which was discussed by Gen. Wistar.